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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,355	07/24/2003	Daniel Tang	AIBT-0304	9139

7590 03/01/2006

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13445 Mandoli Drive
Los Altos Hills, CA 94022

EXAMINER

YOUNG, CHRISTOPHER G

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 03/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/626,355	TANG ET AL.	
	Examiner	Art Unit	
	Christopher G. Young	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 1-14 and 19-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 15-18 in the reply filed on November 29, 2005 is acknowledged.
2. Claims 1-14 and 19-22 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention and species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on November 29, 2005.

Claim Rejections - 35 USC § 102 / § 103

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 15 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yu et al., US Patent Number 5,585,623.

The instant invention is drawn to a photoresist layer processed for e-beam inspection where the out-gas content is less than 0.5% thus substantially preventing out-gassing during the inspection.

There is provided by the prior art a method through which patterned photoresist layer outgassing incident to exposing a patterned photoresist layer to a high energy beam within microelectronics fabrications such as but not limited to integrated circuit microelectronics fabrications may be attenuated. The method realizes this object through implanting a blanket photoresist layer from which is formed the patterned photoresist layer with a first ion beam to form a ion implanted blanket photoresist layer. The first ion beam employs a first ion having a first energy and a first dose sufficient such that an ion implanted patterned photoresist layer formed from the ion implanted blanket photoresist layer will not substantially outgas when the ion implanted patterned photoresist layer is exposed to a second beam. The second beam may be a high energy beam. The ion implanted blanket photoresist layer is then patterned to form the ion implanted patterned photoresist layer whose outgassing incident to exposing the ion implanted patterned photoresist layer to the second beam is attenuated.

With respect to the preferred embodiment of the method of the prior art and with respect to a general embodiment of the method of the prior art, insubstantial outgassing of an ion implanted patterned photoresist layer, such as the ion implanted patterned photoresist layers 12a', 12b' and 12c', is intended to mean a level of outgassing of an ion implanted patterned photoresist layer which does not compromise operation of a microelectronics fabrication process employing the second beam.

Although the prior art is silent with regards to the percentage of out-gas content remaining in the patterned resist prior to inspection, the Examiner can not determine a difference between the instant invention and the teachings of the patent. It appears that the same or similar materials are being processed in the same or similar way to obtain the same benefit, that being reduced out-gassing during inspection. The Examiner

asserts that the claimed percentage is inherent in the teachings of the prior art reference. Alternatively, the Examiner believes that the claim would have been prima facie obvious to one of skill in the art since minimizing the out-gassing improves the overall end product, as taught by the prior art. Furthermore, this limitation is merely an optimization of the process conditions, which would be within a skilled artisans ability in view of the prior art teachings.

6. Claims 16-18 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bernstein et al., US Patent Number 6,458,430.

The instant application claims are drawn to improved conductivity for reduction of electric charging during e-beam inspection. A preferred ion for implantation is carbon.

The prior art teaches a method for use with a plasma immersion ion implantations systems wherein a substrate W having a patterned photoresist P thereon is implanted. The method includes ionizing a first gas in a chamber 12 to produce electrically inactive ions and reacting the electrically active ions with the photoresist P to produce outgassing 64. The outgassed material 64 is continuously evacuated until outgassing is substantially completed. The method further includes ionizing a second gas to produce electrically active ions and implanting a positively charged species of the electrically active ions into the substrate. Also disclosed is a method for curing the photoresist prior to ion implantation. A gas is ionized in the chamber 12 to produce positively and electrons. The electrons are first attracted to a substrate in the chamber having patterned photoresist P thereon for hardening the photoresist. The positively charged ions are then implanted into substrate W wherein photoresist outgassing is substantially prevented.

Claim 1 of the patent recites: In a plasma immersion ion implantation process for implanting dopant ions into a surface of a substrate having an organic photoresist which forms a photoresist mask thereon, wherein said plasma immersion ion implantation process includes placing the substrate having the photoresist mask thereon into a chamber having walls of electrically conductive material, generating an implant plasma

of ions from a first ionizable source wherein said ions include electrically active dopants when implanted into the substrate, and applying voltage pulses between the chamber walls and the substrate independently of the generating of the implant plasma for selectively implanting the electrically active dopant ions into the surface of the substrate, wherein the substrate is pretreated prior to the step of generating the implant plasma so as to substantially prevent implantation of carbon ions resulting from a reaction of the electrically active ions with the organic photoresist, said pretreatment process comprising the steps of: a) generating a pretreating plasma from a second ionizable source to produce pretreatment ions that become electrically inactive when implanted in the substrate; b) reacting the pretreatment ions with the organic photoresist to cause outgassing of an organic reactant product of said pretreatment ions and said photoresist; and c) evacuating said chamber to remove the organic reactant product.

Although the prior art is silent with regards to the specific electric resistivity in the patterned resist prior to inspection, the Examiner can not determine a difference between the instant invention and the teachings of the patent. It appears that the same or similar materials are being processed in the same or similar way to obtain the same benefit, that being reduced electric resistivity (or increased conduction). The Examiner asserts that the claimed amount is inherent in the teachings of the prior art reference. Alternatively, the Examiner believes that the claim would have been prima facie obvious to one of skill in the art since minimizing the resistivity improves the overall end product, as taught by the prior art. Furthermore, this limitation is merely an optimization of the process conditions, which would be within a skilled artisans ability in view of the prior art teachings.

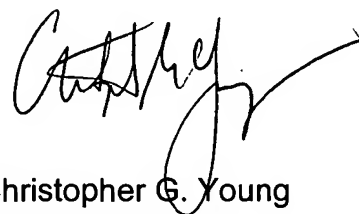
Claim 18 is drawn to implantation of carbon ions. The claim of the prior art states that a pretreatment is done to substantially prevent implantation of the carbon ions, but complete implantation is not discussed. Therefore, implantation of carbon ions is still taught by the prior art reference.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher G. Young whose telephone number is 571-272-1394. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Christopher G. Young
Primary Examiner
Art Unit 1756

cgy